DOUGLAS, ARIZONA WASTEWATER COLLECTION AND POTABLE WATER DISTRIBUTION IMPROVEMENT PROJECT

ENVIRONMENTAL ASSESSMENT

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1.0 BACKGROUND

1.1 INTRODUCTION

The United States (U.S.) Environmental Protection Agency (EPA) is charged with disbursement of funds for water and wastewater infrastructure projects within 100 kilometers of the international boundary between the U.S. and Mexico. The Proposed Action under consideration for funding is the rehabilitation and expansion of the public water distribution and wastewater collection systems of the City of Douglas, Arizona. EPA policy for EPA border funds requires certification by the Border Environment Cooperation Commission (BECC). BECC certifies projects only after evaluating environmental impacts. This environmental assessment (EA) is part of the BECC certification process.

1.2 ENVIRONMENTAL ASSESSMENT PROCESS

EPA has determined that it will follow the National Environmental Policy Act (NEPA) and EPA regulations contained in Title 40 Code of Federal Regulations (CFR) Part 6 for environmental impacts in the U.S. from projects located in the U.S. or Mexico (EPA 1997a). EPA follows the U.S. Agency for International Development (AID) approach as summarized at Title 22 CFR Part 216.1-216.10 as guidance for assessing environmental impacts in Mexico. The AID regulations envision collaboration with affected countries to the maximum extent possible in developing an EA. AID regulations authorize use of either a study prepared by an international body in which the U.S. is a participant, or a concise review of the relevant environmental issues, with appropriate documentation, as a substitute for an EA.

This EA was prepared using Council of Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508) and EPA regulations (40 CFR Part 6) as guidance. This EA documents the environmental consequences in the U.S. of the proposed federal action. Additionally, BECC consulted with the appropriate Mexican agencies to identify transboundary impacts associated with the Proposed Action. Transboundary impacts to Mexico are included in this EA to satisfy AID regulations pertaining to environmental analysis outside the U.S. Transboundary impacts are discussed in the environmental consequences portion of the individual resource sections.

1.3 PURPOSE AND NEED FOR PROPOSED ACTION

The purpose of the Proposed Action is to address the following existing conditions:

- public health concerns arising from overflowing and broken sewer lines, faulty or inadequately maintained septic systems, and faulty septic systems in close proximity to domestic water supply wells;
- overloading of the wastewater treatment plant by precipitation inflow through broken sewer lines;

- soil pollution resulting from the discharge of untreated sewage from failing septic systems and broken wastewater collection lines;
- insufficient public water supply and wastewater infrastructure to meet current demands; and
- inadequate water pressure to maintain public health standards.

EPA intends to authorize the use of North American Development Bank (NADBank) Border Environmental Infrastructure Funds (BEIF) by the City of Douglas (City) to implement the Proposed Action. These funds will be used to finance engineering and expansion of the existing water supply and wastewater collection systems and rehabilitate portions of the existing wastewater collection system. The proposed project will protect public health by eliminating untreated sewage discharges from faulty septic systems in the Musgrave, Douglas Terrace, Sunnyside, Pirtleville, Bay Acres, and Fairview *colonias* and broken wastewater collection lines within the City limits; distribute treated drinking water to the entire Project Area, with the exception of the Bay Acres *colonia;* collect wastewater from current Project Area residents; and maintain adequate pressure in water supply lines to protect public health.

1.4 SCOPE OF EA

The EA focuses on a proposed water and wastewater infrastructure project in the Douglas, Arizona area and the potential direct, indirect, secondary, and cumulative (adverse and beneficial) environmental impacts to the U.S. and Mexico from construction and operation of the proposed improvements. The following general topics are included in the scope of this EA:

- Physical Environment
- Biological Environment
- Cultural Environment
- Transboundary Impacts
- Cumulative Impacts

In preparing an EA, EPA examines various federal cross-cutting laws and Executive Orders (EOs) in accordance with 40 CFR 6.300. These laws and EOs are described below:

National Natural Landmarks - The Secretary of the Interior is authorized to designate areas as National Natural Landmarks for listing on the National Registry of Natural Landmarks pursuant to the Historic Act of 1935, 16 U.S. Code (USC) 461 *et seq*. In conducting the environmental review of the Proposed Action, EPA is required to consider the existence and location of natural landmarks, using information provided by the National Park Service (NPS) pursuant to 36 CFR 62.6(d). No natural landmarks listed on the National Registry of Natural Landmarks were identified within the Project Area.

Cultural Resources Data - The *Archeological and Historic Preservation Act* (AHPA) of 1974, 16 USC 469 *et seq*. provides for the preservation of cultural resources if an EPA activity may cause irreparable loss or destruction of significant scientific, prehistoric, or archeological data. In accordance with the AHPA, the responsible official or the Secretary of the Interior is authorized to undertake data recovery and preservation activities. Consultation with the Arizona State Museum (ASM, the Arizona State Historic Preservation Office (ASHPO), and tribes are discussed in Section 3.3.

Cultural Resources - The *National Historic Preservation Act* (NHPA), as amended, 16 U.S.C. 470, directs federal agencies to integrate historic preservation into all activities which either directly or indirectly involve land use decisions. The NHPA is administered by the National Park Service (NPS), the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers (SHPOs), and each federal agency. Implementing regulations include 36 CFR Part 800: *Regulations of the Advisory Council on Historic Preservation Governing the NHPA Section 106 Review Process*. Section 106 of the NHPA requires federal agencies to take into consideration the impact that an action may have on historic properties which are included on, or are eligible for inclusion on, the National Register of Historic Places (NRHP). The Section 106 review process is usually carried out as part of a formal consultation with the SHPO, the ACHP, and other parties, such as Indian tribes, that have knowledge of, or a particular interest in, historic resources in the area of the undertaking. Consultation with the Arizona State Historic Preservation Office (ASHPO), the Arizona State Museum (ASM), and tribes are discussed in Section 3.3.1. The Section 106 review process will be completed before any ground-breaking activities occur related to the Proposed Action.

Wetlands Protection - EO 11990, "Protection of Wetlands" of 1977, requires federal agencies conducting certain activities to avoid, to the extent possible, adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands, if a practicable alternative exists. Discharge of dredge or fill material into wetlands and other waters of the U.S. are also regulated under Section 404 of the Clean Water Act. No wetlands in the U.S. will be filled or otherwise impacted by the Proposed Action (Dummer, *pers. Comm.* 1999).

Floodplain Management - EO 11988, "Floodplain Management" of 1977, requires federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the extent possible, any adverse effects associated with the direct and indirect development of a floodplain. None of the aspects of the Proposed Action occurs within a U.S. floodplain.

Important Farmlands - EPA Policy to Protect Environmentally Significant Agricultural Lands requires EPA to consider the protection of the nations' significant/important agricultural lands from irreversible conversion to uses that result in their loss as an environmental or essential food production resource. Moreover, the Farmland Protection Policy Act (FPPA), 7 USC 4201 *et seq*., and the U.S. Department of Agriculture's (USDA) implementing procedures require federal agencies to evaluate the adverse effects of their actions on prime and unique farmland, including farmland of statewide and local importance. The project does not involve conversion of, or otherwise affect, prime, unique, or important farmland (NRCS 1999).

Coastal Zone Management Act - The Coastal Zone Management Act (CZMA), 16 USC 1451 *et seq.,* requires that federal agencies in coastal areas be consistent with approved State Coastal Zone Management Programs, to the maximum extent possible. If an EPA action may affect a coastal zone area, the responsible official is required to assess the impact of the action on the coastal zone. The Proposed Action will not affect a coastal zone area.

Coastal Barrier Resources Act - The Coastal Barrier Resources Act (CBRA), 16 USC 3501 *et seq*., generally prohibits new federal expenditures and financial assistance for development within the Coastal Barrier Resources System (CBRS) and therefore protects ecologically sensitive U.S. coastal barriers. This project does not affect any coastal barriers.

Wild and Scenic Rivers - The Wild and Scenic Rivers Act (WSRA), 16 USC 271 *et seq*., establishes requirements applicable to water resource projects affecting wild, scenic, or recreational rivers within the National Wild and Scenic Rivers System, as well as rivers designated on the National Rivers Inventory. No designated wild and scenic rivers occur within the Project Area.

Fish and Wildlife Protection - The Fish and Wildlife Coordination Act (FWCA), 16 USC 661 *et seq*., requires federal agencies involved in actions that will result in the control or structural modification of any natural stream or body of water for any purpose, to take action to protect the fish and wildlife resources that may be affected by the action. No U.S. streams or water bodies will be modified by this project.

Endangered Species Protection - The Endangered Species Act (ESA), 16 USC 1536 *et seq*., prohibits agencies from jeopardizing threatened or endangered species or adversely modifying habitats essential to their survival. No impacts on endangered species or to critical habitats are anticipated from the proposed action.

Wilderness Protection - The Wilderness Act (WA), 16 USC 1131 *et seq*., establishes a system of National Wilderness Areas. The WA establishes a policy for protecting this system by generally prohibiting motorized equipment, structures, installations, roads, commercial enterprises, aircraft landings, and mechanical transport. No wilderness areas occur within the Project Area.

Air Quality - The Clean Air Act (CAA) requires federal actions to conform to any state implementation plan approved or promulgated under Section 110 of the Act. For EPA actions, the applicable conformity requirements specified in 40 CFR Part 51, Subpart W; 40 CFR Part 93, Subpart B; and the applicable state implementation plan must be met. Under the Federal Rule on General Conformity, 40 CFR Part 93, a conformity determination is required only when emissions occur in a non-attainment area. Impacts to air quality from the Alternatives are discussed in Section 3.1.1.

Environmental Justice - EO 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” and the accompanying presidential memorandum, advise federal agencies to identify and address, whenever feasible, disproportionately high and adverse human health or environmental effects on minority communities and/or low-income communities. Environmental justice considerations are discussed in Section 3.10.

2.0 PROJECT DESCRIPTION AND ALTERNATIVES

2.1 CURRENT CONDITIONS

The City of Douglas, Arizona and the surrounding *colonias* (communities) of Pirtleville, Sunnyside, Douglas Terrace, Bay Acres, Musgrave, and Fairview are located in the southern portion of Sulphur Springs Valley in Cochise County (Project Area). The Project Area is adjacent to the international boundary between the United States and Mexico, approximately 105 miles southeast of Tucson. Existing land uses include residential, commercial/manufacturing, agricultural, recreational, and public service. The majority of the *colonia* dwelling units obtain potable water from the Douglas municipal system but lack sewer hook-ups, relying instead on septic systems (Robert Bein 1996).

Table 1 presents population estimates for the Project Area for the years 1996 as well as estimated population served by the project. The 1996 population estimates for Douglas and the *colonias* were obtained from the City of Douglas Wastewater Treatment and Collection System Master Plan (Robert Bein 1996).

Table 1: Population Estimates for the Douglas Project Area

Area of Interest	Estimated 1996 Population*	Estimated Population Served by Project**
City of Douglas	14,780	16,630
Sunnyside	1,500	1,690
Pirtleville	2,000	2,250
Fairview	90	100
Musgrave and Douglas Terrace	240	270
Bay Acres	1300	1500
Total	**19,910**	**22,440**

* Robert Bein 1996
** based on current City of Douglas water accounts

2.1.1 Wastewater Collection System

The existing Douglas municipal wastewater collection system is generally comprised of vitrified clay pipe (VCP) originally installed in 1906 (Robert Bein 1996). Wastewater gravity flows to the Douglas wastewater treatment plant (WWTP) through 163,890 linear feet (LF) of pipe. Twenty-three thousand five hundred linear feet (23,500 LF) of wastewater collection lines are currently overloaded and 25,490 LF of collection lines have leaks (Robert Bein 1996, BECC 2001). Overloading is assumed to occur when the depth of flow-to-diameter of pipe ratio (d/D) exceeds

75 percent for 6- to 12-inch diameter pipelines and 85 percent for larger pipelines (Robert Bein 1996). Broken and leaking pipes are often the result of tree root intrusion. Broken wastewater lines release untreated sewage into the environment and allow stormwater to enter the wastewater collection system (Robert Bein 1996). Thus, 48,990 LF of collection lines are deficient, or approximately 30 percent of the 163,890 LF collection system. Additionally, 18,160 LF of collection lines have flow velocities less than 2.0 feet per second (fps) and 51,890 LF of collection lines exceed the maximum recommended manhole spacing of one per 500 feet (pipeline diameters less than 15 inches) and one per 600 feet (pipelines larger than 18 inches). A minimum pipe flow velocity of 2.0 fps mitigates against sewer overflows caused by pipeline clogging and solids accumulation (Robert Bein 1996). Manhole spacing requirements are provided for ease of maintenance.

Average daily and peak wastewater flows in 1996 were approximately 1.4 and 3.2 million gallons per day (MGD), respectively (Robert Bein 1996). Approximately 3,877 residential accounts and 577 commercial accounts are currently connected to the wastewater collection system (BECC 2001). The residential sewer hook-ups collect wastewater from approximately 12,100 individuals, based on an average household size of 3.12 persons (BECC 2001). The Master Plan (Robert Bein 1996) calculated wastewater generation factors of 715 gallons per day (gpd) per commercial account and 301 gpd per residential account. Using these generation factors, current average daily inflow to the WWTP is approximately 1.58 MGD with peak daily flows of 3.61 MGD.

More than 7,000 individuals residing in the *colonias* and the City of Douglas are not connected to the wastewater collection system, relying instead on private septic systems for sewage treatment and disposal (Robert Bein 1996, Kartchner, *pers comm*. 1999). Private septic systems, of which there are more than 1,500 in the *colonias*, are problematic in the Project Area because residential lots are small and systems are not adequately maintained. Small lots do not provide an adequate area for a leach field, poor maintenance leads to system failure, and the lots typically have no room for expansion when the septic system fails (Cook, pers comm. 1999). Septic systems have failed in the *colonias* resulting in the discharge of raw sewage to streets, backyards, and the environment. Average daily inflows to the municipal WWTP would increase by approximately 0.66 MGD if these 7,000 individuals were hooked up to the wastewater collection system, assuming a wastewater generation factor of 95 gallons per capita per day (gpcd).

2.1.2 Wastewater Treatment Plant

Improvements to the Douglas WWTP are not part of this project and are not included in any of the Alternatives presented in this EA. These WWTP improvements have already been approved. The design and funding processes are complete and construction is almost finished. A description of WWTP improvements is included in the EA to demonstrate that the City has adequate treatment capacity to accommodate additional inflows from potential expansion of the wastewater collection system.

The City of Douglas' WWTP is located on 12.8 acres (5.2 hectares) in the southwest corner of the City (T24S, R27E, Section 23) immediately adjacent to the international boundary between the United States and Mexico (Robert Bein 1996). The following improvements were constructed under an U.S. Army Corps of Engineers grant agreement with the City of Douglas (BECC 2001):

- The old secondary clarifier was refurbished.
- One of the existing aerators was refurbished.
- An existing aerator was converted into an equalization basin.
- Confined space safety equipment was installed.
- Piping was replaced and the aeration split box was upgraded.
- Aeration basin outlet weirs were enlarged.
- The chlorine contact chamber was upgraded.
- Mixing was added to the digester.
- Miscellaneous electrical upgrades.

The expanded WWTP has a design capacity of 2.6 MGD, including nitrification/denitrification processes; the capacity of the old secondary clarifier was only 1.3 MGD. The improved WWTP will produce a higher quality effluent and comply with Arizona Department of Environmental Quality (ADEQ) Aquifer Protection Plan (APP) requirements. The State of Arizona requires an APP for all facilities that discharge pollutants either directly to an aquifer or to the land surface or vadose zone in such a manner that reasonable probability exists of the pollutant reaching an aquifer (ADEQ 1999a). Sewage and wastewater treatment facilities are included under the definition of discharging facilities (ADEQ 1999a). Issuance of an APP only occurs when the applicant facility is using the best available demonstrated technology and proves that aquifer water quality standards (*see* Arizona Administrative Code [AAC], Title 18, Chapter 9) will not be violated at a point of compliance (ADEQ 1999a). Without the aforementioned improvements to the wastewater treatment process, discharge from the Douglas WWTP could not meet effluent requirements contained in AAC Title 18. With the WWTP improvements in place, effluent will be chlorinated to meet APP requirements and then de-chlorinated to meet irrigation requirements in Aqua Prieta, Sonora. Further, the City will be required to monitor effluent quality and submit reports to ADEQ as part of compliance activities, after the APP is issued.

2.1.3 Public Water Supply System

The City of Douglas obtains 100 percent of its water supply from the Douglas/Agua Prieta groundwater basin (Robert Bein 1997). The City owns fourteen public supply water wells throughout the Project Area, four of these wells have been abandoned (Robert Bein 1997). The average annual rate of groundwater production from 1990 to 1995 was around 3,100 acre-feet per year (af/yr), or 2.8 MGD (Robert Bein 1997). The water distribution system consists of distribution pipelines ranging in size from 3- to 18-inches in diameter, ten active wells, four abandoned wells, four reservoirs, one pressure relief valve, and one inactive booster pumping station (Robert Bein 1997). The four reservoirs have a storage capacity of 5.9 million gallons (MG) (Robert Bein 1997). One of the reservoirs is partially buried with a capacity of 5.0 MG, the remaining three surface reservoirs have a capacity of 300,000 gallons apiece (Robert Bein 1997). The Project area is currently served by two pressure zones. The high pressure zone is located on the east side of the Project area and the low pressure zone occurs on the west side.

The City's Water System Master Plan (Robert Bein 1997) reported an average service population of 5,005 between 1992 and 1995. These 5,005 customers were categorized as low density residential, medium-high density residential, commercial, and golf course, schools, parks, and irrigation and consumed an average of 2.38 MGD (2,644 af/yr) (Robert Bein 1997). Table 2 presents average daily water consumption and accounts for 1992 through 1995.

Table 2. Average Daily Water Consumption, 1992 - 1995

Land Use Category	Accounts	Consumption (MGD)	Average Daily Consumption Per Account (gallons)
Low Density Residential	4,152	1.65	397*
Medium-High Density Residential	307	0.26	847
Commercial	502	0.41	816
Golf Course/Schools/ Parks/Irrigation	43	0.06	1,395
Total	**5,005**	**2.38**	**476**

*127 gpcd based on an average household size of 3.12 persons.
SOURCE: Robert Bein 1997

The difference between the average daily production of 2.8 MGD and the consumption rate of 2.38 MGD is attributed to leaks in the distribution system and un-metered usage. The difference between production and consumption amounts to a loss of about 15 percent; equivalent to the national average loss for a municipal water supply system (Metcalf & Eddy 1991).

The existing potable water distribution system covers the entire area within the Douglas city limits. The public water system currently serves approximately 4,564 residential accounts and 672 commercial accounts. The estimated daily water consumption is 3.02 MGD; 0.55 MGD commercial and 1.96 MGD residential. Estimated daily consumption was calculated from the commercial and a weighted average residential consumption rates presented in Table 2, golf course/schools/parks/irrigation consumption of 0.51 MGD, and 0.003 MGD for the Douglas Municipal Airport from the Master Plan (Robert Bein 1997). This represents an increase of 0.64 MGD over the 1992 through 1995 average, or 21 percent. Assuming a loss factor of 15 percent, the municipal groundwater wells pump approximately 3.47 MGD to meet existing water demands.

Analysis of the Safe Drinking Water Violation Report for the Douglas Water Department showed the City to have been in violation of the Safe Drinking Water Act (SDWA) 33 times from 1990 to 1998. Identified violations were 15 repeat minor coliform monitoring violations, two acute coliform maximum contaminate level (MCL) violations, 14 monthly coliform MCL violations, one average coliform MCL violation, and one regular monitoring violation for gross alpha particle violations (EPA 1999). The City has had only one coliform violation since March 1998 and this was attributed to improper handling of the water sample (Kartchner, *pers. Comm.* 1999).

The Master Plan identified water system improvements necessary to provide efficient and reliable service, and maintain public health in the Project Area through 2006. The primary improvement identified in the Master Plan is the creation of a new pressure zone to serve the portion of the Project Area located east of Van Buren Avenue (Robert Bein 1997). This area currently experiences a static pressure of approximately 32 psi and can only meet the 40 psi requirement when demand is low and all wells are in operation (Robert Bein 1997). The normal working pressure in the distribution system, as mandated in ADEQ Engineering Bulletin No. 10, should be between 40 and 70 psi, except during a serious fire when pressure is allowed to drop as low as 20 psi . A normal working pressure of at least 40 psi keeps sediment in suspension and prevents bacteria and algae growth in the distribution lines. The other needed improvements were identified based on existing levels of development -- construction of new transmission pipelines to convey water more efficiently through the system; and installation of a pressure reducing station (Robert Bein 1997). The Master Plan also identifies the need to construct new transmission pipelines to convey water to the Fairview, Musgrave, and Douglas Terrace *colonias* (Robert Bein 1997). Transmission pipelines for Pirtleville and Sunnyside *colonias* are also included in the Proposed Alternative. The City may also need to construct an additional 1,200 gallon per minute (gpm) groundwater well to ensure that water supplies exceed 125 percent of the projected maximum daily water demand (11 MGD [12,320 af/yr]) in 2006 (Robert Bein 1997). However, installation of a new groundwater well is not part of any Alternative presented in this EA.

The City of Douglas currently controls the operation of its water supply wells and distribution storage reservoirs with a telemetry system. Each well, storage tank, and reservoir in the distribution system, with the exception of the Golf Course Reservoir and Well No. 6, is connected to the telemetry system. Well No. 6 is directly controlled by the water level in the Golf Course Reservoir (Robert Bein 1997).

Transducers on each storage tank and reservoir transmit information on the water level, in terms of percent full, to a Control Center at the City of Douglas Public Works Department via leased telephone lines. Each well has an “On/Off” point set between the 50 and 100 percent-full storage tank levels. The percent-full reading will increase as storage water levels rise, wells will begin to shut-down as they reach their set point or the system is 100 percent full. Storage levels drop as water demand increases, wells receive a signal to begin pumping when the water level drops below the set point (Robert Bein 1997).

The telemetry system was installed to communicate reliable information on the status of the City's water facilities to the Control Center. However, the telemetry control boards on the groundwater wells are susceptible to being blown out by lightening during the late summer monsoon season. When this occurs, the well cannot receive the signal to stop pumping when its set point is reached. The well(s) will continue to pump until the "On/Off" switch at the Control Center is tripped by a City employee. Blown out control boards can lead to reservoirs overflowing and replacement can take more than six weeks (Robert Bein 1997).

2.2 DESCRIPTION OF ALTERNATIVES (INCLUDING THE PROPOSED ACTION)

The Project Area is defined as the incorporated limits of the City of Douglas and an area extending 1/4 mile beyond these limits; the unincorporated *colonias* of Pirtleville, Sunnyside, Bay Acres, Fairview, Musgrave, and Douglas Terrace; the WWTP discharge point to the Rio Agua Prieta in Sonora, Mexico; and the area directly impacted by this discharge. Figure 1 presents the Project Area with proposed improvements, both inside the city limits (Alternatives 2 and 3) and outside the city limits (Alternative 2).

2.2.1 Alternative 1 - No Action

The existing water supply and wastewater collection systems will not be expanded or rehabilitated under Alternative 1. If the No Action Alternative is selected, the current situation will continue as the project will not be engineered and constructed. Soil pollution will continue in the Project Area, and the water supply and wastewater collection problems identified in the previous section are expected to worsen as the number of users increase and the system continues to deteriorate. The No Action Alternative would not eliminate the health hazards associated with failing on-site sewage treatment units and broken wastewater collection lines that occasionally overflow and send raw sewage onto the streets, as described by Mr. Matt Cook, Environmental Manager of the Douglas Health Department on August 18, 2000. Existing wastewater flows and potable water consumption will continue. Potable water will continue to be lost to leaks in the system, un-metered usage, and potential reservoir overflows when the telemetry system breaks down.

2.2.2 Alternative 2 - Proposed Action - Water and Sewer Connection to City of Douglas Residents and *Colonias* of Pirtleville, Musgrave, Douglas Terrace, Sunnyside, Bay Acres, and Fairview

Alternative 2, the Proposed Action, will allow the City of Douglas to rehabilitate and expand its potable water distribution and wastewater collection lines consistent with the recommendations presented in the City of Douglas Water and Wastewater Master Plans (Robert Bein 1996, 1997).

Figure 1. City of Douglas Proposed Water and Wastewater Improvements
Click here to view

This Alternative is projected to address the water and wastewater needs of Douglas and the surrounding *colonias* of Pirtleville, Musgrave, Douglas Terrace, Sunnyside, Bay Acres, and Fairview. Alternative 2 does not contemplate development of additional water supply sources, wastewater reuse projects, or improvements to the wastewater treatment plant.

Improvements to the Potable Water Distribution System
The existing water distribution system is deteriorating and needs to be expanded to serve all of the residents of Douglas and surrounding *colonias*. The system will be expanded by installing approximately 34,110 (LF) of new water lines, bringing the total length of the distribution system to 229,110 LF. The City also proposes to install a programmable logic controller (PLC) to replace the existing 25-year old telemetry system. The PLC will provide the City with better monitoring capability and provide equipment necessary for interfacing with a supervisory control and data acquisition (SCADA) system.

Alternative 2 will replace or rehabilitate leaky water lines to reduce water losses and address ADEQ pressure requirements for the water distribution system, as described in ADEQ Bulletin 10. Creation of a new pressure zone in central Douglas will prevent substandard residual pressure. Table 3 presents construction projects, year of implementation, and estimated cost for improvements to the potable water distribution system Proposed under Alternative 2.

Table 3: Potable Water Distribution System Improvements, Summary of Alternative 2 Projects and Probable Costs (2000 dollars)

Project Name & Feature	Year of Implementation	Estimated Cost (USD)
16-inch water line from Florida Street to Van Buren (5,425 LF)	2003	$515,004
16-inch water transmission main along A Avenue from 23rd Street to Lawrence Street (2,785 LF)	2004-2005	$224,060
12-inch water line upgrade on Irvine Street from Madison Street to North Douglas Avenue (4,000 LF)	2000-2001	$185,763
Valve replacements - citywide	2000-2001	$57,500
SCADA control system for 10 wells	2002-2003	$207,000
Low-pressure zone • 12-inch water line in low-pressure zone, 7th Street from F Avenue to Dolores Avenue (3,950 LF), Dolores Avenue from 5th Street to 15th Street (3,900 LF), and J Avenue from 2nd Street to 3rd Street (750 LF). • 8-inch water line, Eddie Avenue from 15th Street to 23rd Street (2,850 LF).	2002-2003	$591,560
Low-high booster station at well 12, replacement of existing pumps, controls, electrical system, and reconnect lines to distribution system.	2002-2003	$43,102
Pressure reducing station on 5th Street between Dolores Avenue and	2002-2003	$34,500

Table 3: Potable Water Distribution System Improvements, Summary of Alternative 2 Projects and Probable Costs (2000 dollars)

Project Name & Feature	Year of Implementation	Estimated Cost (USD)
Florida Avenue.		
12-inch water line on North Douglas Avenue from US Highway 80 to Pirtle Avenue (2,500 LF)	2003-2004	$108,905
8-inch water line on Franklin Avenue from Pirtle Avenue to Palm Avenue (1,100 LF)	2003-2004	$39,407
Fairview System • 8-inch water line on Fir Avenue from North Douglas to Valley Avenue (1,250 LF) • 6-inch water line on Crystal Avenue from Valley Avenue to Fairview Avenue (1,300 LF) • 6-inch water line on Fairview Avenue from Crystal Avenue to Murray Avenue (900 LF) • 8-inch water line on Valley Avenue from Merrit Avenue to Murray Avenue (2,200 LF) • 6-inch water lines on Anderson Avenue, Chase Avenue, and Merrit Avenue from Valley Avenue to Sulfur Springs (1,200 LF)	2004-2005	$278,141
Lawrence-Sulfur Springs, A Avenue, F Avenue, G Avenue, 10th Street, valve replacement	2000-1001	$772,720
Total		**$3,057,662**

SOURCE: BECC 2001

Under Alternative 2, potable water will be delivered to all residents of the City of Douglas and five of the six *colonias* (Pirtleville, Sunnyside, Fairview, Musgrave, and Douglas Terrace). The service area population is estimated to be 22,440. Potable water consumption for residential uses will increase to approximately 2.68 MGD, assuming average residential consumption of 128 gpcd, an increase of approximately 0.72 MGD over existing residential use (1.96 MGD). Total water consumption is expected to increase to 3.86 MGD by project completion in 2006, non-residential consumption rates are based on estimates in the Water System Master Plan (Robert Bein 1997): commercial (0.56 MGD); golf course/schools/parks/irrigation (0.62 MGD); and Douglas Municipal Airport (0.003 MGD).

Improvements to the Wastewater Collection System

The proposed wastewater collection system improvements will provide 100 percent coverage to the current population in the Project Area. Alternative 2 will add 93,379 LF of new sewer lines to the existing collection system. Alternative 2 also includes rehabilitation of wastewater lines that exhibit inflow characteristics or are overloaded. Rehabilitation includes repairing or replacing broken pipelines or pipelines damaged by root intrusion (25,490 LF of pipeline). Rehabilitation of broken pipelines may involve removal of soils contaminated by sewage and transportation of impacted soils to an approved landfill. Pipelines currently experiencing overflows (23,500 LF of pipeline) will either be replaced with larger diameter pipe or paralleled to provide hydraulic relief (Robert Bein 1996). The majority of these replacement lines will be constructed under paved streets, the remainder will be placed under unpaved right-of-ways and existing utility easements (BECC 2001). Table 4 presents a summary of proposed Alternative 2 wastewater collection improvement projects, year of planned implementation, and estimated costs.

Table 4: Wastewater Collection System Improvements, Summary of Alternative 2 Projects and Probable Costs (2000 dollars)

Project Name & Feature	Year of Implementation	Estimated Cost
12-inch sewer main from Wye Street to 3rd Street (1,979 LF)	2004-2005	$184,430
12-inch sewer line for the midtown sewer upgrades from 6th Street and San Antonio to the E-F Avenue, 3rd - 4th Street at alley intersection (8,282 LF)	2005-2006	$440,565
Southside sewer upgrade, consisting of reaches #4400 through #4410 as described in the Wastewater Master Plan (13,780 LF)	2005-2006	$320,330
Bagwell Ranch laterals (8-inch sewer lines) which will serve the *colonias* just north of the Douglas city limits (8,200 LF)	2005-2006	$94,950
8-inch lateral on 34th Street (3,122 LF)	2002-2003	$75,840
Citywide root intrusion repairs, generally east of Pan American Avenue and south of 20th Street	2000-2001	$199,918
Central trunk from wastewater treatment plant to North Douglas to SR-80, thence east and north to Pan American at 18th Street • 24-inch section (9,362 LF) • 18-inch section (3,150 LF)	2001-2002	$1,020,979
15-inch North Douglas interceptor from SR-80 to Lawrence Avenue (4,188 LF)	2001-2002	$320,956
Bay Acres *Colonia* sewer main and laterals • Kline Avenue from 23rd Street to 27th Street (15-inch - 2,086 LF) • Gladiola Street (8-inch - 2,119 LF) • Iris Street (8-inch - 1,969 LF) • Violet Street (8-inch - 1,639 LF) • North Hawthorn (8-inch - 1,300 LF) • Primrose Street (8-inch -1,307 LF) • Aster Street (8-inch - 1,826 LF) • Dahlia Street (8-inch - 1,536 LF) • Carnation Street (8-inch - 2,262 LF)	2003-2004	$926,864
Fairview sewer laterals • Merrit Avenue from Douglas Street to Sulfur Springs (8-inch - 2,487 LF)	2004-2005	$283,972

Table 4: Wastewater Collection System Improvements, Summary of Alternative 2 Projects and Probable Costs (2000 dollars)

Project Name & Feature	Year of Implementation	Estimated Cost
• Valley Avenue from Merrit Avenue to Anderson Avenue (8-inch - 872 LF) • Chase Avenue from Valley Avenue to Sulfur Avenue (8-inch - 1,294 LF) • Anderson Avenue from Valley Avenue to Sulfur Avenue (8-inch - 1,313 LF) • Valley Avenue from Fir Avenue to Ash Avenue (8-inch – 523 LF)		
Midtown sewer upgrades - north central • Alley between E/F Avenues and 3rd Street to alley between 14th/15th Streets (12-inch - 4,322 LF) • Alley between 14th/15th Streets and alley between E/F Avenues at Bonita Avenue (8-inch - 2,561 LF)	2003-2004	$278,148
Bonita interceptor on E/F alley (6,000 LF)	2000-2001	$341,280
• 1-2 Alley to 3rd Street (600 LF) • 7-8 Alley from E Avenue to E-F alley (300 LF) • 13-14 Alley from D Avenue to E-F alley (700 LF) • 15-16 Alley from B Avenue to E-F alley (1,500 LF) • 10-11 Alley from Carmelita to A Avenue (800 LF) • 14-15 Alley from Dol. To Carmelita (800 LF) • 10-11 Alley from Florida to Rose (400 LF) • 11-12 Alley from Florida Avenue to Cochise (800 LF)	2000-2001	$206,500
Hook-ups	2001-2002	$16,913
Hook-ups	2003-2004	$47,975
Hook-ups	2004-2005	$36,426
Hook-ups	2005-2006	$87,118
Total		**$4,883,164**

SOURCE: BECC 2001

Under Alternative 2, wastewater collection will be extended to all residents of the City of Douglas and all six of the *colonias* (Pirtleville, Sunnyside, Fairview, Musgrave, Bay Acres, and Douglas Terrace). The service area population is estimated at 22,440 based upon current water accounts. Daily average residential wastewater flow will average approximately 1.99 MGD, assuming a daily wastewater production rate of 95 gpcd, an increase of approximately 0.82 MGD over existing residential wastewater flow. The Wastewater Master Plan (Robert Bein, 1996) estimates that commercial land uses will generate 1,500 gallons per day/acre or 0.56 MGD. Total Alternative 2 wastewater generation is estimated to be 2.55 by project completion in 2006. Peak daily wastewater flow is expected to increase to 5.52 MGD.

2.2.3 Alternative 3 – Water and Sewer Connection to City of Douglas Residents Only

Alternative 3 will allow the City of Douglas to rehabilitate its potable water distribution and wastewater collection lines within the city limits only. The project components included in Alternative 3 comprise a portion of the recommended improvements presented in the water and wastewater master plans prepared for the City of Douglas (Robert Bein 1996, 1997). Alternative 3 will not extend potable water and wastewater collection lines into the currently unserviced portions of the surrounding *colonias*. Existing and future development in these areas will continue to rely upon septic systems for wastewater disposal and private groundwater wells for drinking water. Alternative 3 also does not contemplate development of additional water supply sources, wastewater reuse projects, or improvements to the wastewater treatment plant.

Improvements to the Potable Water Distribution System
The existing water distribution system is deteriorating. Rehabilitation of the existing potable water distribution system will be accomplished by installing approximately 19,660 LF of water lines, 14,450 LF fewer lines than the Preferred Alternative. The City also proposes to install a programmable logic controller (PLC) to replace the existing 25-year old telemetry system. The PLC will provide the City with better monitoring capability and provide equipment necessary for interfacing with a supervisory control and data acquisition (SCADA) system.

Alternative 3 will replace or rehabilitate leaky water lines in the City of Douglas to reduce water losses and address ADEQ pressure requirements for the water distribution system, as described in ADEQ Bulletin 10. Creation of a new pressure zone in central Douglas will prevent substandard residual pressure. Table 5 presents construction projects, year of implementation, and estimated cost for improvements to the potable water distribution system proposed under Alternative 3.

Table 5: Potable Water Distribution System Improvements, Summary of Alternative 3 Projects and Probable Costs (2000 dollars)

Project Name & Feature	Year of Implementation	Estimated Cost (USD)
16-inch water line from Florida Street to Van Buren (5,425 LF)	FY2003	$515,004
16-inch water transmission main along A Avenue from 23rd Street to Lawrence Street (2,785 LF)	2004-2005	$224,060
Valve replacements - citywide	2000-2001	$57,500
SCADA control system for 10 wells	2002-2003	$207,000
<u>Low-pressure zone</u> • 12-inch water line in low-pressure zone, 7th Street from F Avenue to Dolores Avenue (3,950 LF), Dolores Avenue from 5th Street to 15th	2002-2003	$591,560

Table 5: Potable Water Distribution System Improvements, Summary of Alternative 3 Projects and Probable Costs (2000 dollars)

Project Name & Feature	Year of Implementation	Estimated Cost (USD)
Street (3,900 LF), and J Avenue from 2nd Street to 3rd Street (750 LF). • 8-inch water line, Eddie Avenue from 15th Street to 23rd Street (2,850 LF).		
Low-high booster station at well 12, replacement of existing pumps, controls, electrical system, and reconnect lines to distribution system.	2002-2003	$43,102
Pressure reducing station on 5th Street between Dolores Avenue and Florida Avenue.	2002-2003	$34,500
Lawrence-Sulfur Springs, A Avenue, F Avenue, G Avenue, 10th Street, valve replacement	2000-1001	$772,720
Total		**$2,445,446**

SOURCE: BECC 2001

Under Alternative 3, the existing potable water distribution system will be rehabilitated to improve service within the City of Douglas; potable water distribution will not be extended to the *colonias*. The City of Douglas population is estimated at 16,630 people. Residential consumption of City water will increase to approximately 2.13 MGD, assuming a daily consumption rate of 128 gpcd, an increase of 0.17 MGD over the existing condition; 1.09 MGD less than the Proposed Alternative. Using the conservative assumption that all non-residential development will occur within the city limits, total water consumption from the municipal system will increase to 3.31 MGD. This represents an increase of 0.74 MGD over the existing condition.

Improvements to the Wastewater Collection System

Wastewater collection system improvements proposed under Alternative 3 will provide 100 percent coverage within the Douglas city limits by the project completion in 2006. Wastewater service will not be extended to the *colonias*, these areas will continue to rely on septic systems for waste disposal. Alternative 3 will add 66,658 LF of new sewer lines to the existing collection system, 26,721 LF fewer than the Preferred Alternative. Alternative 3 also includes rehabilitation of wastewater lines that exhibit inflow characteristics or are overloaded. Rehabilitation includes repairing or replacing broken pipelines or pipelines damaged by root intrusion (25,490 LF of pipeline). Rehabilitation of broken pipelines may involve removal of soils contaminated by sewage and transportation of impacted soils to an approved landfill. Pipelines currently experiencing overflows (23,500 LF of pipeline) will either be replaced with larger diameter pipe or paralleled to provide hydraulic relief (Robert Bein 1996). The majority of replacement lines will be placed under paved streets, the remainder will be placed under unpaved rights-of-way and existing utility easements (BECC 2001). Table 6 presents a summary of proposed Alternative 3 wastewater collection improvement projects, year of planned implementation, and estimated costs.

Table 6: Wastewater Collection System Improvements, Summary of Alternative 3 Projects and Probable Costs (2000 dollars)

Project Name & Feature	**Year of Implementation**	**Estimated Cost**
12-inch sewer main from Wye Street to 3rd Street (1,979 LF)	2004-2005	$184,430
12-inch sewer line for the midtown sewer upgrades from 6th Street and San Antonio to the E-F Avenue, 3rd - 4th Street at alley intersection (8,282 LF)	2005-2006	$440,565
Southside sewer upgrade, consisting of reaches #4400 through #4410 as described in the Wastewater Master Plan (13,780 LF)	2005-2006	$320,330
Bagwell Ranch laterals (8-inch sewer lines) which will serve the *colonias* just north of the Douglas city limits (8,200 LF)	2005-2006	$94,950
8-inch lateral on 34th Street (3,122 LF)	2002-2003	$75,840
Citywide root intrusion repairs, generally east of Pan American Avenue and south of 20th Street	2000-2001	$199,918
Central trunk from wastewater treatment plant to North Douglas to SR-80, thence east and north to Pan American at 18th Street • 24-inch section (9,362 LF) • 18-inch section (3,150 LF)	2001-2002	$1,020,979
Midtown sewer upgrades - north central • Alley between E/F Avenues and 3rd Street to alley between 14th/15th Streets (12-inch - 4,322 LF) • Alley between 14th/15th Streets and alley between E/F Avenues at Bonita Avenue (8-inch - 2,561 LF)	2003-2004	$278,148
Bonita interceptor on E/F alley (6,000 LF)	2000-2001	$341,280
• 1-2 Alley to 3rd Street (600 LF) • 7-8 Alley from E Avenue to E-F alley (300 LF) • 13-14 Alley from D Avenue to E-F alley (700 LF) • 15-16 Alley from B Avenue to E-F alley (1,500 LF) • 10-11 Alley from Carmelita to A Avenue (800 LF) • 14-15 Alley from Dol. To Carmelita (800 LF) • 10-11 Alley from Florida to Rose (400 LF) • 11-12 Alley from Florida Avenue to Cochise (800 LF)	2000-2001	$206,500
Hook-ups	2001-2002	$16,913
Total		**$3,179,853**

SOURCE: BECC 2001

Under Alternative 3, wastewater collection will be expanded to provide wastewater collection within the existing Douglas city limits; wastewater collection will not be extended to the *colonias*. The City of Douglas population is estimated at 16,630. Daily residential wastewater flow will average approximately 1.58 MGD or 0.41 MGD less than the Proposed Alternative (a.k.a. Alternative 2), assuming a wastewater generation factor of 95 gpcd. Using the conservative assumption that all non-residential development will occur within the city limits, commercial wastewater generation is projected to be 0.56 MGD (*see* Section 2.2.2, *Improvements to the Wastewater Collection System*). Total Alternative 3 wastewater generation will average approximately 2.14 MGD. Peak daily wastewater flow is expected to increase to 4.72 MGD.

2.2.4 Comparison of the Alternatives

Table 7 presents a summary of estimated wastewater inflows under the three wastewater collection system Alternatives.

Table 7. Estimated Wastewater Inflows to the Douglas Municipal System under the Existing Condition and the Alternatives

	Average Daily Wastewater Inflow (MGD)			
Land Use Category	**Existing Condition**	**Alternative 1 – No action**	**Alternative 2**	**Alternative 3**
Residential	1.17	≤ 1.58	1.99	1.58
Commercial	0.41	≤ 0.56	0.56	0.56
Average Daily Flow	**1.58**	**£ 2.14**	**2.55**	**2.14**
Peak Daily Flow	**3.61**	**£ 4.72**	**5.52**	**4.72**

Table 8 presents a summary of estimated potable water consumption from the municipal system under the three water distribution system Alternatives.

Table 8. Estimated Potable Water Demand for Douglas Municipal Water under the Existing Condition and the Alternatives

	Estimated Demand for Douglas Municipal Water (MGD)			
Land Use Category	**Existing Condition**	**Alternative 1 – No action**	**Alternative 2**	**Alternative 3**
Residential	1.96	1.96	2.68	2.13
Commercial	0.55	0.55	0.56	0.56

Golf Course/ Schools/Parks/Irrigation	0.51	0.51	0.62	0.62
Municipal Airport	0.003	0.003	0.003	0.003
Total Demand	**3.02**	**3.02**	**3.86**	**3.31**
Estimated Groundwater Production to Meet Demand	**3.47***	**3.47***	**£4.44****	**£3.80****

* Assumes a 15 percent loss factor.
** Assumes that the loss factor will decrease as a result of distribution system rehabilitation and installation of the PLC under this Alternative.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 PHYSICAL ENVIRONMENT

3.1.1 Climate, Air Quality, Visibility, and Odor

Affected Environment

Climate for the Douglas area is semi-arid with hot summer days, moderate winter days and low humidity. Average monthly high temperatures range from 62.3° Fahrenheit (F) in January to 95.3° F in June. Average monthly low temperatures range from 28.9° F in January to 64.2° F in June. Almost all of the precipitation occurs as rainfall. Precipitation ranges from 10 to 20 inches per year with an average of 14.60 inches per year. Almost half of the rainfall occurs during the "monsoon" season between June and August.

The prevailing wind direction in the Douglas area is from the southeast with mean wind speeds from 7 to 9 miles per hour. The nearest National Weather Service (NWS) station is located in Tucson, Arizona. Figure 2 shows a windrose plot for the Tucson International Airport NWS station for the year 1992 as an example of the wind patterns around the Tucson and Douglas areas. This windrose shows the frequency of winds from sixteen different compass directions. Figure 2 shows that over 20 percent of the winds are from the southeast.

The ambient pollution levels of the EPA criteria pollutants; nitrogen oxides (NO_X), volatile organic compounds (VOCs), and carbon monoxide (CO) in the Douglas area are below the ambient air quality concentration limits for each pollutant. Ambient concentrations of sulfur dioxide (SO_2) historically have been measured at concentrations greater than the ambient concentration limits. Elevated concentrations of SO_2 were primarily due to the emissions from a copper smelter in the Douglas area. This smelter was dismantled in late 1987 and is no longer in operation. ADEQ is currently preparing a request to the EPA for Redesignation to Attainment for SO_2. This redesignation would remove the Douglas area from non-attainment status for SO_2 ambient concentrations.

The Douglas area is considered to be in non-attainment of the PM-10 ambient air quality standard. Studies of the particulate emissions indicate that 60 percent of the PM-10 in the Douglas area originates in Mexico. The largest source of PM-10 was generated from unpaved road dust (81.4 %). The second largest emission source is agricultural activities (11.9 %). The remaining sources of dust emissions were paved roads, agricultural burning, cleared areas, windblown agricultural land, off-road vehicles and unpaved parking lots. Due to the non-attainment status, ADEQ developed a State Implementation Plan (SIP) to address the airborne dust issue and submitted this plan to EPA in mid-1993. The SIP was deemed complete and ADEQ is currently awaiting review and approval by the EPA.

Figure 2. Wind speed and direction plot: Tucson, Arizona 1992
Click here to view

Monitoring data from the Douglas area show that the 24-hour and annual ambient PM-10 standards have been met for the past several years. The last 24 hour average concentration to exceed the PM-10 ambient concentration limit of 150 micrograms per cubic meter (ìg/m^3) occurred in 1991 with an ambient concentration of 233 ìg/m^3. The last annual concentration violation of the 50 µg/m^3 standard occurred in 1989 with a 55 ìg/m^3 concentration reading.

Due to the low humidity and remote locations of western cities like Douglas, visibility impairment is minimal. Visibility impairment occurs as a result of scattering and absorption of light by particles and gases in the atmosphere. The EPA has developed a network of monitors, known as the Interagency Monitoring of Protected Visual Environments (IMPROVE) to establish current visibility conditions and to track visibility trends within selected national parks and wilderness areas.

One of the IMPROVE monitors is located at the Chiricahua National Monument approximately 50 miles to the northeast of Douglas. The monitor located at this national monument records ambient concentrations of pollutants likely to impair visibility. These concentrations are used to develop values of light extinction. Light extinction is a value measured in inverse megameters (Mm^{-1}) and is the sum of light scattering and light absorbing particles and gases in the atmosphere. The larger the light extinction coefficient the greater the visibility impairment.

Table 9 below shows the average light extinction coefficients for various national parks and wilderness areas across the country. Data from the Chiricahua National Monument show that visibility in the southeastern portion of Arizona is good. It should be noted that visibility is affected more easily in clear areas than hazy ones. This means that small amounts of pollutants are capable of noticeably impairing visibility in pristine areas such as the Chiricahua National Monument.

Table 9: Selected Light Extinction Coefficients

Name	**Location**	**Average (middle 20%) Light Extinction Coefficient (Mm^{-1})**
Chiricahua NM	SE Arizona	17.94
Grand Canyon NP	Northern Arizona	14.80
Yosemite NP	Central California	21.18
Shenandoah NP	Virginia	80.73
Acadia NP	Maine	41.28

There are no odor producing sources near the Douglas wastewater treatment system other than the wastewater treatment plant and the sludge drying beds. Due to the remote location of the wastewater treatment plant, no odor problems have been experienced in the Douglas area. A recreation complex consisting of soccer, baseball, and basketball areas is situated in Mexico, across the border from the WWTP.

Environmental Consequences

Under Alternatives 2 and 3, temporary and minor fugitive dust emissions could be created during construction. The fugitive dust emissions could impact both ambient PM-10 concentrations and visibility in the immediate vicinity of excavations, but would not be expected to significantly contribute to air quality degradation in wilderness areas around Chiricahua National Monument. Fugitive dust emissions would be expected to last longer under Alternative 2, compared with Alternative 3, because Alternative 2 involves more excavation. Standard dust suppression techniques such as watering of active construction areas, aggregate piles and cleared areas would substantially minimize these air quality impacts.

Minor and localized odor impacts may occur during excavation and replacement of old or broken wastewater collection lines. These odor impacts are temporary in nature, lasting only as long as excavation activities. Odor impacts associated with pipe replacement are expected to be the same under Alternative 2 and 3 because both Alternatives replace the same quantity of old or broken pipe. Alternatives 1, 2, and 3 are not expected to generate significant transboundary impacts to air quality, visibility, odor, or climate in Mexico. No evidence was provided showing adverse odor impacts to Mexico from any of the Alternatives. Odors experienced at the athletic fields, across the border from the WWTP, may improve once the new clarifier becomes operable; however, increased sludge wasting and drying may offset these improvements.

Although the Proposed Alternative is delivering service to existing populations in the City of Douglas and six *colonias*, presently there are vacant lots that could potentially be developed in the future. Over time an additional estimated 4,000 people may occupy 1,030 undeveloped acres that currently exist. This development could occur even if the Proposed Alternative is not implemented as potential new homes would rely on individual water wells and septic systems, as is currently permitted under local regulations or on privately-developed systems. Implementation of the Proposed Project, Alternative 3, may accelerate some of this development.

The State's 1993 Air Quality Plan shows about 29% of total PM-10 emissions in the area being from vehicles in Douglas. An increase of 4,000 people would be expected to increase PM-10 from driving by about 18% over current levels. Based on an estimate of a population of 19,000 when the air quality plan was developed, this would mean an increase of about 310 tons per year of emissions. That would represent an increase of slightly over 6% in total emissions. PM-10 and PM-2.5 from unpaved roads, if left unpaved, and potential construction emissions as new development is built would result in additional increases, but could be mitigated through paving of roads and taking dust suppression measures during construction.

3.1.2 Geology and Soils

Affected Environment

The Project Area is located within the Douglas basin of southeastern Arizona (ADWR 1997a). The 750 square mile Douglas basin is bordered on the east by the Swisshelm, Pedrogosa, and Perilla Mountains, on the south by the international boundary with Mexico, and on the east by the Mule and Dragoon Mountains (ADWR 1997a). The northern edge of the Douglas basin is defined by a series of small, unnamed hills extending westward from Pearce, Arizona to the Swisshelm Mountains (ADWR 1997a). The alluvial valley slopes to the south with elevations ranging from approximately 4,350 feet above mean sea level (AMSL) in the northern portions to 3,900 feet AMSL at the international boundary near Douglas, Arizona (ADWR 1997a). Surrounding mountains have peak elevations ranging from 6,390 feet AMSL to 7,185 feet AMSL in the Perilla and Swisshelm Mountains, respectively (ADWR 1997a). Project area geology consists of Holocene to latest Pleistocene alluvium deposits (AGS 1988).

Soils within the City of Douglas and other developed areas within the Project Area are primarily classified as Libby-Gulch complex with inclusions of Ubik and Riveroad soils along drainageways (NRCS 1999). Other soil types found within the Project Area are the Blackeney - Luckyhills and Forrest - Bonita complexes (NRCS 1999). Soils within the Project Area are formed from parent material of mixed alluvium (NRCS 1999), consistent with local geology. Project area soils tend to be well-drained with slow to moderately slow permeability rates with the exception of Ubik, Blakeney, and Luckyhills soils which have moderately rapid permeability rates (NRCS 1999). The Project Area does not contain any farmlands designated Prime and Unique by the U.S. Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS) (NRCS 1999).

Percolation rates within the Project Area range from 17 to 29 minutes per inch as measured by the Cochise County Department of Health (Cook, *Personal Communication* 1999). This percolation rate is considered adequate for onsite septic systems, providing that leach fields are adequately sized and septic systems are maintained. Most septic systems within the Project Area are functioning properly; however, septic systems have failed from lack of maintenance (Cook *Personal Communication* 1999). Additional soil pollution potentially arises from undersized and illegal septic systems (Cook *Personal Communication* 1999), and sewage collection pipes experiencing root intrusion.

Environmental Consequences

Under Alternative 1, adverse impacts to soil from improperly maintained and illegal septic systems, and leaking, broken, and clogged sewage collection pipelines will continue. Further, adverse impacts to soil may increase in the future because new homes in the *colonias* will use septic systems since connections to the City's wastewater collection system will not be available.

Alternative 2, the Proposed Action, will minimize impacts to soil from improperly maintained or illegal septic systems, and leaking sewage collection lines. First, all current residents of the Project Area will be connected to the wastewater collection system. Second, the Proposed Alternative will repair or replace existing undersized, failing, or broken sewage lines. Future development in the Project Area will be connected to the municipal wastewater collection system, eliminating the potential for future soil pollution from improperly constructed or inadequately maintained septic systems.

Alternative 3 will minimize impacts to soils within the Douglas city limits by rehabilitating or replacing leaking sewage collection lines and ensuring that all residents within the city limits are connected to the municipal wastewater collection system. Potential adverse impacts to soils in the *colonias* are expected to continue under Alternative 3, these areas will continue to rely on septic systems for sewage disposal. Moreover, future development outside the city limits will be forced to use septic systems because hook-ups to the municipal system will not be available. Section 3.3.3 includes a discussion of contaminated soil disposal, a potential issue under Alternatives 2 and 3.

Alternatives 1, 2, and 3 are not expected to generate transboundary impacts to geology and soils in Mexico because WWTP discharges will meet water quality standards as directed by the facility's APP and be de-chlorinated to be suitable for irrigation use in Mexico (*see* Section 2.1.2).

3.1.3 Water Resources

3.1.3.1 Surface Water

<u>Affected Environment</u>

Whitewater Draw is the primary surface water drainage in the Project Area, although small ephemeral washes are also present (ADWR 1997a). Whitewater Draw drains the 750 square mile Douglas basin in a southerly direction, continuing across the International Boundary as part of the Yaqui River watershed of northern Mexico (ADWR 1997b). Whitewater Draw is renamed the Rio Agua Prieta after crossing the International Boundary. Mexican farmers divert water from the Rio Agua Prieta to irrigate grains and other feed crops (Kartchner, *pers. Comm.*1999). The Yaqui River eventually drains into the Gulf of California near Guaymas (ADWR 1997b). The City of Douglas, Arizona does not withdraw water from or discharge water to Whitewater Draw. The City's WWTP discharges approximately 1.58 MGD (1,756 af/yr) of treated wastewater to the Rio Agua Prieta, south of the International Boundary in the Mexican State of Sonora.

The two mile reach of Whitewater Draw through the Project Area was perennial until 1976 when Whitewater Draw became intermittent after widespread groundwater pumping lowered the regional water table. Since 1976, Whitewater Draw only flows during the summer monsoon season and winter snowmelt (ADWR 1997b). The annual flow of Whitewater Draw averages

6,730 acre-feet (af), as measured at U.S. Geological Survey (USGS) stream gaging station 9537500 "Whitewater Draw near Douglas" (ADWR 1997b). Designated uses established by the State of Arizona's Water Quality Standards for Whitewater Draw are: aquatic and wildlife warmwater; full body contact; fish consumption; agricultural irrigation; and agricultural livestock watering (AAC, Title 18, Ch. 11).

The 6-mile reach of Whitewater Draw from Mule Gulch to the International Border was listed in Arizona's 1998 Water Quality Limited Waters List (303(d) list) (ADEQ 1998). ADEQ identified arsenic, beryllium, copper, dissolved oxygen, lead, manganese, turbidity, and zinc as water quality stressors in this reach. ADEQ conducted additional sampling in 1998 and found Whitewater Draw to be in compliance with water quality standards and capable of supporting designated uses (ADEQ 2000). The State expects to remove Whitewater Draw from its list of water quality limited waters (i.e., 303(d) list) when the list is next updated (Marsh, *pers. Comm*. 2000).

Water quality in the Rio Agua Prieta is unknown since no sample results are available. Flow in the Rio Agua Prieta is expected to be comprised largely of treated effluent from the City of Douglas WWTP. The WWTP improvements discussed in Section 2.1.2 are expected to improve the quality of treated wastewater being discharged from the Douglas wastewater treatment facility to the Rio Agua Prieta. The improved WWTP must comply with requirements in its APP permit and de-chlorinated to meet irrigation requirements in Mexico; historically discharges from the Douglas WWTP were not subject to State or Federal water quality regulations since the discharge point occurs in Mexico.

Environmental Consequences

Alternatives 1, 2, and 3 are not expected to have any long-term adverse impacts on surface water quality in the United States or Republic of Mexico. In the short-term, construction of water supply and wastewater collection lines associated with Alternatives 2 and 3 may result in sediment discharges and increased suspended solids and turbidity downstream from construction activities. Best management practices (BMPs) (e.g., turbidity curtains, sediment traps, straw bales, etc.) and other mitigation measures (e.g., maintaining vegetated buffer zones between construction areas and waters of the U.S.) will be used to minimize erosion and sedimentation around construction areas. Sediment impacts, should they occur, will be temporary and are not expected to increase annual total suspended solid (TSS) loads over time.

In the long-term, direct, indirect, or cumulative impacts to surface water quantity of the United States are not expected from Alternatives 1, 2 or 3 because the City of Douglas neither withdraws from nor discharges water to Whitewater Draw or any other Water of the United States.

Under Alternative 1, discharges to the Rio Agua Prieta (Sonora, Mexico) from the Douglas WWTP may increase from 1.58 MGD (1,756 af/yr) to as much as 2.14 MGD (2,378 af/yr), depending on the level of growth in the existing service area. The average annual flow of the Rio

Agua Prieta may increase from 8,486 af/yr to 9,108 af/yr, the discharge from the WWTP plus the average annual flow of Whitewater Draw (6,730 af/yr).

Under Alternative 2, discharges from the Douglas WWTP are expected to increase to approximately 2.55 MGD (2,833 af/yr). Thus, the average annual flow of the Rio Agua Prieta is expected to increase by 11 percent to 9,563 af/yr.

Under Alternative 3, discharges from the Douglas wastewater treatment plant are expected to increase to 2.14 MGD (2,378 af/yr). Thus, the average annual flow of the Rio Agua Prieta is expected to increase by 7 percent to 9,108 af/yr.

3.1.3.2 Groundwater

Affected Environment

The City of Douglas pumps groundwater from the Douglas basin's basin-fill aquifer. The Project Area is included within the boundaries of the Douglas Irrigated Non-Expansion Area (INA). Within the Douglas basin, irrigation is only allowed on land that was irrigated from 1975 through 1980. Irrigation is defined as the use of water to grow crops for animal or human consumption. Thus, domestic and municipal water uses are not subject to the restrictions imposed by the INA classification.

Groundwater withdrawals from the entire Douglas basin peaked at 138,000 af/yr in the early 1970s and have steadily declined as farmland is taken out of production (ADWR 1997a). By 1990, groundwater pumpage was estimated at approximately 43,000 af/yr (Rascona 1993). Of that basin wide withdrawal of 43,000, the estimated City of Douglas withdrawals total 9% or 3,855 af/yr.

City of Douglas groundwater records show that the average pumping rate between 1990 and 1995 was 2.8 MGD (3,100 af/yr) (Robert Bein 1997). Although current pumping rates are not readily available, pumping rates to serve current demand (3.02 MGD) in the project area (City of Douglas and the *colonias*) can be estimated as 3.47 MGD (3,855 af/yr) (Table 8), assuming a 15 percent loss factor.

In 1990, measured water levels in the basin-fill aquifer ranged between 50 and 296 feet below ground surface (ADWR 1997a). Recorded water levels for Douglas' ten active wells range from 122.3 to 386.9 feet below ground surface (ADWR 1997c). Water levels in the Douglas municipal wells declined by an average of 29 feet between 1979 and 1998 (ADWR 1999).

Total groundwater recharge in the Douglas basin is estimated to be 22,000 af per year (ADWR 1997a). Mountain-front precipitation is the main source of groundwater recharge in the Douglas basin at 20,000 af per year (ADWR 1997a). A small amount of recharge may result from streambed infiltration from Whitewater Draw and other ephemeral washes in the basin (ADWR

1997a). Direct recharge from valley floor precipitation is negligible because of high evaporation rates and clay and caliche layers which impede the downward percolation of water (ADWR 1997a).

A comprehensive study examining the full range of groundwater quality parameters of the Douglas basin has not been undertaken; however, currently available data suggests that much of the groundwater is suitable for human consumption (ADEQ 1999b). Table 10 presents water quality data collected by ADEQ from three Douglas municipal water wells. Results from targeted sampling by ADEQ did not identify septic systems, smelter slag heaps, or wastewater discharges as currently being associated with adverse groundwater quality impacts in the Project Area (ADEQ 1999b).

Table 10. Quality of Groundwater Pumped from City of Douglas Wells as Sampled in 1995 and 1996

	Well Identification Number		
Constituent	**D-24-27 10DAA**	**D-24-27 13BDB**	**D-24-28 18CAD**
Calcium, total (mg/l)	<5.0	ND	34.7
Magnesium, total (mg/l)	ND	ND	13.8
Sodium, total (mg/l)	251	124	84.3
Potassium, total (mg/l)	2.09	1.14	4.02
HCO3 (mg/l)	148	190	184
Sulfate (mg/l)	109	46.6	129
Chloride, total (mg/l)	222	29.2	27.7
NO3/NO2 (mg/l)	0.80	1.49	1.65

SOURCE: ADEQ 1999b
ND = Not Detected

Environmental Consequences

Water consumption of the approximately 22,440 residents in the project area is an estimated 3.47 MGD. Currently, these residents' water needs are supplied partially by the City of Douglas water system and partially by domestic water wells. Under Alternative 1, the no action alternative, this arrangement will continue. Under Alternatives 2 and 3, the City of Douglas will provide water service to a greater portion of the population and the municipal water consumption will increase while domestic (private well) pumping will decrease.

Under Alternative 2 municipal water consumption is projected to be 3.86 MGD (4,289 af/yr).

Using a loss factor of 15 percent, the pumping rates will be approximately 4.44 MGD (4,932 af/yr). This value is expected to represent the upper bound on potential pumping rates, as system rehabilitation and the new PLC are expected to reduce the loss factor. City groundwater withdrawals under Alternative 2 will increase by up to 1,077 af or 22 percent, if the loss factor stays at 15 percent. With estimated total annual withdrawals from the entire Douglas basin at 43,000 af, under Alternative 2 groundwater withdrawals from the Douglas basin will increase 1,077 af or 11.5 percent over current basin withdrawals.

Under Alternative 3 municipal water demand is expected to increase to 3.31 MGD. Groundwater production to meet this projected demand is expected to be 3.8 MGD (4,229 af/yr) under Alternative 3 with a 15 percent loss factor. Rehabilitation of the existing water distribution system and installation of the new PLC under Alternative 3 will improve system efficiency and reduce water losses, information is not readily available to estimate how these improvements will affect the loss factor.

The proposed project will improve potable water service for the existing population and should not directly result in an immediate increased water demand in the project area. However, the *colonias* presently have vacant lots that could potentially be developed in the future. Over time an additional estimated 4,000 people may occupy 1,030 undeveloped acres that currently exist in the *colonias*. Therefore, through the delivery of water services to the *colonias*, the proposed project may result in further depletion of groundwater resources. However, this could occur even under existing conditions as new residents would rely on individual water wells and septic systems, as currently permitted by local regulations, or on privately-developed systems.

A continuing decline of groundwater levels in the Douglas basin would be expected to occur under all Alternatives; average annual aquifer recharge for the entire basin is approximately 22,000 af (ADWR 1997a) and 1990 basin withdrawals totaled 43,000 af (Rascona 1993), resulting in an average annual deficit of 21,000 af. Groundwater is the only source of potable water in this area and withdrawals will increase as the population grows. Alternatives 1 and 3 will not expand the existing municipal water service area; however, the total volume of groundwater pumped in the Project Area will continue to increase as new developments in the *colonias* will be required to drill domestic water supply wells. The lack of municipal water connections in these areas may discourage future development because developers will have to develop their own water supplies. As a result, the rate of groundwater development under Alternatives 1 and 3 may be slower than under Alternative 2, which potentially could expedite growth in the *colonias*. In Alternative 2, if the available undeveloped areas are fully built out, the potential 4,000 new residents would result in an additional 0.4 MGD (440 af/yr) groundwater withdrawal. However, the rate of development may be more dependent on local economic conditions than the availability of municipal water.

Groundwater benefits associated with Alternative 2 include gains in efficiency, reliability, public health, and economics. By centralizing water production on the ten municipal wells the City assumes responsibility for pumping and delivering potable water, and ensuring that this water

Alternatives 1 and 3 is subject to hydrologic interference if wells are drilled too close to one another, individuals are responsible for drilling deeper or new wells if groundwater levels continue to drop, and presents possible health risks if groundwater wells are located in close proximity to failing septic systems.

Continued septic system use under Alternatives 1 and 3 may result in elevated nitrate levels in the groundwater. Untreated sewage could potentially reach the aquifer through downward percolation through the soil or downward movement through poorly cemented groundwater wells drilled for domestic water supply. However, it is unlikely that discharges of untreated sewage will cause nitrate levels (as N) to reach EPA's maximum contaminant level (MCL) of 10 mg/l given the current low levels (<2 mg/l) and the depth of the aquifer (>100 feet below ground surface); high evaporation rates and clay and caliche layers also impede the downward percolation of water (ADWR 1997a). Rehabilitation of broken wastewater collection pipes (Alternatives 2 and 3) and connecting the entire Project Area to the wastewater collection system (Alternative 2) will eliminate discharges of untreated wastewater to the environment, reducing the potential risk to the aquifer from nitrate contamination.

The City of Douglas has proposed a wastewater reuse program. This program would use treated effluent to irrigate the golf course, airport, and other public spaces. The reuse program is still in the preliminary design phase, and is not contemplated in any of the Alternatives presented in this EA. However, a reuse program could reduce groundwater withdrawals by as much as 0.62 MGD (688 af/yr), the estimated 2006 water demand for the golf course/schools/parks/irrigation land use category (Robert Bein 1997). Alternatives 1, 2, and 3 are not expected to generate significant transboundary impacts to groundwater resources in Mexico. Alternative 2 may have positive transboundary benefits if the availability of additional treated effluent precludes the need for the City of Agua Prieta to withdraw groundwater for power plant cooling (*see* Section 3.1.3.1) or if the increased volume of treated wastewater discharged from the Douglas WWTP reduces the need to pump groundwater for irrigation. Agua Prieta, however, has not identified an alternate water supply for power plant cooling. Substitution of treated effluent for groundwater has not been corroborated by Mexican officials.

3.2 BIOLOGICAL ENVIRONMENT

The biological environment includes the biotic or living components of the ecosystem present within the Project Area. Biotic components include vegetation; special aquatic sites such as wetlands; wildlife; and threatened, endangered, or other special status species. The affected environment and environmental consequences for each of these components are described below.

3.2.1 Vegetation and Wetlands

Affected Environment

The Project Area is located in the semidesert grassland biotic community, which transitions into the Chihuahuan desert scrub community east of Douglas (Brown, 1994). The landscape is typical semidesert grassland consisting of short grasses intermingled with a variety of large, well-spaced scrub-shrub perennials. Perennial grasses common to this grassland type include black grama (*Bouteloua eriopoda*) and other grama species (*Bouteloua* spp.), *Muhlenbergia porteri*, *Aristida* spp., *Triachachne californica*, and *Panicum obtusum*. Sotals (*Dasylirion* spp.), agaves (*Agave* spp.), yuccas (*Yucca* spp.), and beargrasses (*Nolina* spp.) may also be found in semidesert grassland. Dominant scrub-shrub species can include mesquite (*Prosopis* spp.), one-seed juniper (*Juniperus monosperma*), graythorn (*Zizyphus obtusifolia*, *Condalia spathulata*), and Mormon or Mexican tea (*Ephedra trifurca*, *E. Antisyphilitica*). Important cacti species include barrel cactus (*Ferocactus wislizenii*), cane cholla and prickly pears (*Opuntia* spp.), and pincushions (*Mammillaria* spp.).

The Chihuahuan desert scrub community, which borders the semidesert grassland of Douglas, is shrub-dominated. Creosote bush (*Larrea tridentata*), tarbush (*Flourensia cernua*), and whitethorn acacia (*Accacia neovernicosa*) are common, as are yuccas, agaves, sotols, and beargrasses.
Surface water drainage within the Project Area flows southward via Whitewater Draw in the U.S. and Rio Agua Prieta in Sonora, Mexico. Wetlands were not identified in the Project Area; however, small palustrine and riverine type wetland habitats may be associated with Whitewater Draw and Rio Agua Prieta.

Environmental Consequences

Most of the area directly affected by the project consists of developed urban or suburban landscapes. Under these conditions, habitat for native species is typically degraded and where vegetation exists it is often dominated by non-native plants, and noxious or other weedy species. The current conditions would be expected to continue under Alternative 1. Under Alternatives 2 and 3, impacts would primarily occur within existing right of ways in areas that have been developed. Impacts to previously undisturbed native communities would be minimal. Impacts to the non-native vegetation within the urban and suburban areas would likely be short-lived, as reseeding or revegetation would be undertaken following disturbances. Some type of revegetation measure is necessary or, there would be an increased potential for the establishment and proliferation of noxious or other weedy species. If left unchecked, a weed infestation could spread to native communities causing localized areas of habitat degradation. Temporary impacts are expected to cover a larger geographic area under Alternative 2, compared to Alternative 3, because construction activities will also occur in the *colonias*.

Vegetation could also be affected along the 25,490 feet of pipeline with problems related to root intrusion where vegetation may be enhanced by the presence of septic systems. In these cases, the removal of these water sources could result in a loss in vigor and senescence. Vegetation affected by expansion and enhancement of the wastewater system would be primarily landscape vegetation rather than native plant communities.

The U.S. Army Corps of Engineers (USACE) administers Section 404 of the Clean Water Act, governing the placement of dredged or fill materials into wetlands and other Waters of the U.S. Consultation with USACE indicates that activities resulting from the project would likely be covered under Nationwide Permit number 12, utility line backfill and bedding. Based on a review of topographic maps and conversations with the USACE, wetlands have not been identified within the Project Area although the possibility exists that there could be wetland habitat present in parts of Whitewater Draw, or one of its two tributaries within the Project Area.

Due to the scope of the project and no changes in discharges in the United States, impacts to wetlands, floodplains, riparian areas or other Waters of the U.S. from activities associated with Alternatives 2 are not anticipated. By extension, Waters of the U.S. are not expected to be adversely impacted by activities associated with Alternative 3. The activities contemplated under Alternative 3 are a subset of the Alternative 2 activities reviewed by the USACE.

Alternatives 1, 2, and 3 are not expected to generate transboundary impacts to vegetation and wetlands in Mexico since all ground disturbance will occur in the United States. According to Mr. Miguel Angel Gonzalez of Agua Prieta's Planning and Social Development Department, there are no identified wetlands along the Rio Agua Prieta course on the Mexican side.

3.2.2 Wildlife and Threatened and Endangered Species

<u>Affected Environment</u>

Typical wildlife species found in the semidesert grassland include small mammals such as black-tailed jack rabbit (*Lepus californicus*); spotted ground squirrel (*Spermophilus spilosoma*); Ord's, banner-tailed, and Merriam's kangaroo rats (*Dipodomys ordii*, *D. spectabilis*, *D. merriami*); badger (*Taxidea taxus*); and coyote (*Canis latrans*). Common birds of the semidesert grassland include Swainson's hawk (*Buteo swainsoni*); prairie falcon (*Falco mexicanus*); mourning dove (*Zenaida macroura*); scaled quail (*Callipepla squamata*); road runner (*Geococcyx californianus*); loggerhead shrike (*Lanius ludovicianus*); and meadow lark (*Sturnella magna*).

Herpetofauna are more prevalent than mammals in the Chihuahuan desert scrub community bordering the semidesert grassland. Typical species include the Texas banded gecko (*Coleonyx brevis*); roundtail horned lizard (*Phrynosoma modestum*); spiny lizards (*Sceloporus* sp.); trans-Pecos ratsnake (*Elaphe subocularis*); western hooknose snake (*Ficimia cana*); and Mohave rattlesnake (*Crotalus scrutulatus*).

USFWS identified 15 endangered species, six threatened species, and two species proposed for listing under the Endangered Species Act of 1973, as amended, that may be found in Cochise County, Arizona (USFWS 1999). Four candidate species were also identified by USFWS as potentially occurring within Cochise County; however, no critical habitat for any listed, proposed, or candidate species was identified within the Project Area. Threatened, endangered, proposed, and candidate species identified by the USFWS for Cochise County are as follows:

Endangered Species
Canelo Hills ladies' tresses (*Spiranthes delitescens*)
Huachuca water umbel (*Lilaeopsis schaffneriana* ssp. *recurva*)
Jaguar, United States Population (*Panthera onca*)
Jaguarundi (*Felis yagouaroundi tolteca*)
Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*)
Mexican gray wolf (*Canis lupus baileyi*)
Ocelot (*Felis pardalis*)
Yaqui chub (*Gila pirpurea*)
Yaqui topminnow (*Poeciliopsis occidentalis sonoriensis*)
American peregrine falcon (*Falco peregrinus anatum*)
Cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*)
Northern Aplomado falcon (*Falco femoralis septentrionalis*)
Southwestern willow flycatcher (*Empidonax traillii extimus*)
Whooping crane (*Grus americana*)
Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*)

Threatened Species
Cochise pincushion cactus (*Coryphantha robbinsorum*)
New Mexican ridge-nosed rattlesnake (*Crotalus willardi obscurus*)
Beautiful shiner (*Cyprinella formosa*)
Yaqui catfish (*Ictalurus pricei*)
Bald eagle (*Haliaeetus leucocephalus*)
Mexican spotted owl (*Strix occidentalis lucida*)

Proposed Species
Blumer's dock (*Rumex orthoneurus*)
Mountain plover (*Charadrius montanus*)

Candidate Species
Lemon fleabane (*Erigeron lemmonii*)
Gila chub (*Gila intermedia*)
Huachuca springsnail (*Pyrgulopis thompsoni*)
Chiricahua leopard frog (*Rana chiricahuensis*)

No documented occurrences of the aforementioned species were found in the Project Area by a review of the Arizona Department of Game and Fish's Heritage Data Management System

(ADGF 1999). No species considered endangered by Mexican authorities are found within the Project Area (Alvarez, *pers. Comm*. 1999).

Environmental Consequences

Since the water supply and wastewater infrastructure primarily occur within previously disturbed areas, the existing system would have a minimal effect on wildlife and no effect on threatened or endangered species. Alternative 1 would maintain the current situation and therefore not produce any additional effects. Alternatives 2 and 3 involve construction and rehabilitation of municipal water and wastewater pipelines which could potentially effect some wildlife species primarily through noise and dust. Such effects would be limited in extent and short-lived; however, the area of impact would be greater under Alternative 2 compared with Alternative 3. The nature of the project under Alternatives 2 and 3 limit impacts to existing rights-of-way in urban and suburban areas and as such, limits impacts to documented wildlife species. There would be no effects on threatened or endangered species since neither these species nor critical habitat have been documented within the Project Area.

No impacts to aquatic species are anticipated from any of the Alternatives.

Alternatives 1, 2, and 3 are not expected to generate transboundary impacts to wildlife and threatened and endangered species in Mexico.

3.3 CULTURAL RESOURCES

Affected Environment

Cultural resources are any prehistoric or historic district, site, or building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. They include archaeological resources (both prehistoric and historic), historic architectural resources, and traditional cultural resources. Only significant cultural resources (as defined in 36 CFR 60.4) are considered for potential adverse impacts from an action. Significant archaeological and architectural resources are either eligible for listing, or listed on, the NRHP. Significant traditional cultural resources are identified by Indian tribes or other groups, and may also be eligible for the NRHP. Four tribes with cultural affiliation in southern Arizona were consulted and provided information on known prehistoric and historic sites located in the project area as well as proposed actions to be taken that will ensure one site, located 65 feet from the proposed construction, will not be effected.

The Archaeological Site Files of the ASM and the ASHPO were reviewed to identify previously recorded cultural resources located within the Project Area. There are no National Register-listed historic properties within the Project Area. ASM lists seven cultural resource sites and 10 archaeological survey projects in the Project Area. Four of the identified resources are historic and include the old State Route 80, the abandoned Southern Pacific Railroad Line, and an old power line. The remaining three resources are prehistoric archaeological sites, consisting of potsherds and lithic scatters. ASHPO identified 16 cultural resources within the few locations that have been systematically inventoried for cultural resources within the Project Area.

An historic site has been identified in the area near the site of the Panamerican sewer line, within the Douglas city limits. This site consists of a foundation of an historic structure, two concentrations of mining slag, a pit and five mounds. The mounds are between 2.0 and 5.0 m in diameter and between 0.2 and 1.2 m in height and consist of dirt and historic objects. According to the Arizona State Museum records, items found at the site include glass, nails, concrete, bucket, wire, china, and redware.

Environmental Consequences

Under Alternative 1, the current situation would continue and EPA funds would not be used to implement the water and wastewater improvements. Alternative 1 would not impact cultural resources in Arizona, and is not expected to generate trans-boundary impacts to cultural resources in Mexico.

Alternative 2 and Alternative 3 consist of replacing or installing water and sewer connections to City of Douglas residents. The Panamerican sewer line replacement, located within the Douglas city limits, is approximately 65 feet from an identified historic site. Due to this proximity, three measures will be followed, although not required, to ensure that the site is not effected. First, a chain-link fence will be installed surrounding the site. Second, the contractor will be required to keep all construction-related machinery north of the proposed wastewater collection system alignment. Third, an archaeologist will be hired during installation of the chain-link fence and construction of the pipe segment between stations 1350 and 1600, to ensure appropriate treatment of historic resources that might be found.

Furthermore, any excavation by the contractor that uncovers an historic or archaeological artifact shall be immediately reported to the project engineer and the City of Douglas. Construction shall be temporarily halted pending notification and receipt of further direction by US EPA, after consultation with representatives of the City of Douglas and State Historic Preservation Office.

3.4 LAND USE AND INFRASTRUCTURE

Affected Environment

The Project Area is located approximately 105 miles southeast of Tucson, Arizona in the southern Sulphur Springs Valley of Cochise County. Land use within the 10,400 acre Project Area falls into one of six categories: low density residential (1,660 acres); medium-high density residential (60 acres); commercial (340 acres); golf course/schools/parks/irrigation (620 acres); Douglas Municipal Airport (690 acres); and undeveloped (7,030 acres). The City anticipates that by 2006 the acreage in each land use category will change to: low density residential (2,720 acres); medium-high density residential (110 acres); commercial (375 acres); golf course/schools/parks/irrigation (505 acres); Douglas municipal airport (690 acres); and undeveloped (6,000 acres) (Robert Bein 1997).

Infrastructure potentially affected by the project are the potable water distribution system and the wastewater collection system. The potable water system currently includes ten groundwater wells and a system of distribution lines, storage facilities, and pumps. The wastewater collection system serves customers through a gravity system with 163,890 linear feet of pipeline. Land planned for expansion of the potable water distribution system, the wastewater collection system, and construction of the wastewater reuse system is either zoned low-density or part of an already developed portion of the Project Area. The majority of potential land disturbance will occur in already developed areas that either need to be connected to the City infrastructure or need repairs on the existing systems.

Environmental Consequences

Under Alternative 1, land use and infrastructure will remain unchanged. Future growth of the Project Area will rely upon individual wells and septic systems. Under Alternative 2 and 3, infrastructure improvements will increase the number of homes connected to the City's water supply and sewage collection system. Alternative 2 will provide water and sewage service to the entire Project Area. The Water System Master Plan (Robert Bein 1997) assumed full water service to the Project Area and estimated that 1,030 undeveloped acres would be developed between 1996 and 2006. Low density residential development is expected to occur on 1,060 acres that were either previously undeveloped or associated with development around the golf course (Robert Bein 1997). Thus, Alternative 2, the Alternative closest to the conditions described in the Water System Master Plan, could result in the development of up to 1,030 acres. This is the largest identified adverse impact to land use. Land use impacts under Alternatives 1 and 3 are expected to be less than or equal to the impacts under Alternative 2. The lack of municipal water and wastewater service outside of the existing city limits may serve as a disincentive for development, slowing the growth rate in the *colonias*. Under all Alternatives, there will be a loss of land used for golf courses/schools/parks/irrigation and undeveloped land in exchange for a gain in residential and commercial land uses.
Alternatives 1, 2, and 3 are not expected to generate transboundary impacts to land use and infrastructure in Mexico.

3.5 HAZARDOUS AND SOLID WASTE

Affected Environment

A broad hazardous waste assessment of the communities associated with the project alternatives was performed to define the potential for contamination to be encountered during excavation associated with the alternatives. The first step was a search of EPA's Resource Conservation and Recovery Information System (RCRIS). RCRIS is a database of facilities known to generate or handle hazardous waste. This search identified 11 facilities in the Project Area. None of these facilities discharge to the public wastewater collection and treatment system (Eyre, *pers. Comm*. 1999, Kartchner, *pers Comm*. 1999).

The second step in the assessment was a search of EPA's Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS). The CERCLIS system is another database. This database includes facilities and sites that have been subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) because of releases or other circumstances that present the potential for community impacts. CERCLA sites are often referred to as "Superfund" sites. The CERCLIS search did not identify any CERCLA Superfund sites in the Project Area.

The third step in the assessment was a preliminary review of the project area's land uses and their corresponding potential to present a risk for creating known or unknown contaminant deposits in area soils or contaminant plumes in local groundwater that might overlay existing or proposed water and wastewater systems. The review was cursory due to the large network of water and wastewater facilities associated with the project and the large geographic area involved. Facilities of concern included, but were not limited to, gasoline service stations, dry cleaners, auto repair facilities and other businesses that handle hazardous materials, but would not be included in the RCRIS or CERCLIS databases. In summary, like most communities, the project area is expected to include small, isolated locations where leaking tanks, faulty storage facilities, failing drainage systems or inappropriate practices have lead to soil and groundwater contamination. The possibility exists that existing pipelines or proposed pipelines may pass through these areas of contamination.

The existing wastewater treatment plant generates approximately 514 pounds per day (lbs/day) of dry solids (dried sludge), or approximately 94 dry tons per year (tons/year) (Robert Bein 1996). Dry solids from Douglas' wastewater treatment plant are disposed of at the Cochise County landfill.

In 1999, the City recently disposed of 200 tons of dried sludge at the County landfill (Kartchner, *pers. Comm.* 1999). This sludge passed the required tests for metals, hydrocarbons, and other regulated constituents (Kartchner, *pers. Comm.* 1999).

<u>Environmental Consequences</u>

Alternative 1 would not involve excavation, so hazardous materials that may be present in the environment would not be encountered and indirect impacts from rehabilitated pipelines and expanded water and wastewater systems that alleviate certain constraints to growth would not occur. However, sewage already released into the environment would remain in place and future releases of sewage from faulty wastewater pipes would continue. Alternative 1 would continue to have adverse impacts that would be substantially reduced by Alternative 2 and moderately reduced by Alternative 3.

Alternatives 2 and 3 would involve removal of degraded wastewater pipelines and associated soils contaminated by sewage and would be expected to involve excavation, removal and disposal of soils with the potential to be contaminated by hydrocarbons and other pollutants in some locations. Alternative 2 would involve more excavation than Alternative 3, so related impacts could be greater for Alternative 2. The volumes of material that could be expected could be considerable, depending on the nature and extent of soil contamination from untreated sewage or other contaminants.

Handling and disposal of damaged wastewater pipe and associated soils contaminated by sewage are managed by standard practices followed by the wastewater industry. These practices are intended to protect worker health and safety and the environment. Waste pipe and associated contaminated soils would be excavated, placed into haul trucks and brought to the County landfill. No significant environmental risks are associated with the process and this long-term disposal method due to standard practices implemented in the field and design features and management practices at the County landfill. The capacity of the County landfill is not expected to be significantly impacted by the addition of this material.

The practices to be implemented in the event that the soils or groundwater encountered during excavation are contaminated by adjacent land uses are standardized by local, state and federal regulations and procedures. In summary, local government workers and any contractors hired to perform or oversee excavation will be trained to identify locations, site circumstances and soil and water characteristics that present the potential to create a hazardous waste issue. Protocol to be followed under specific conditions will be understood and followed by workers in the field. This protocol will include a series of steps to be followed from contaminant verification through handling, storage, transportation and disposal of hazardous materials and wastes. Consultation with the appropriate governmental authorities is prescribed by local, state and federal regulations and will be followed.

Given these practices, no significant risks to workers or environmental impacts would be expected to result. Liability for the costs associated with contaminant from adjacent land uses would be based on a variety of laws and regulations associated with hazardous waste. In summary, the party responsible for the discharge of waste is liable for clean-up costs. These matters will require site specific investigations and negotiations.

Alternative 2 and 3 present some indirect and secondary growth inducing impacts by alleviating certain constraints to local growth that are reflected by assumptions made in the Water and Wastewater Master Plan that is the source of the proposed improvements. Under Alternative 2, the quantity of sludge generated by the wastewater treatment plant is expected to increase to approximately 822 lbs/day (150 tons/yr) of dry solids with an average daily inflow of 2.55 MGD. Under Alternative 3, the quantity of sludge generated by the wastewater treatment plant will increase to approximately 690 lbs/day (126 tons/yr) of dry solids with an average daily inflow of

2.14 MGD. The County landfill will be able to accommodate the additional sludge generated under Alternative 2 or 3 (Kartchner, *pers. Comm.* 1999). Sludge composition is not expected to change significantly as most new users will be residential.

Alternatives 1, 2, and 3 are not expected to generate any transboundary impacts related to hazardous and solid wastes in Mexico.

3.6 ENERGY AND NATURAL RESOURCES

Affected Environment

The City of Douglas purchases electricity from Arizona Public Service (ADC 1999). The electricity distribution system appears adequate for the City's current needs as no evidence of brownouts or other forms of power shortages was identified. Southwestern Gas Corporation provides natural gas to the City of Douglas (ADC 1999).

Water is the only natural resource consumed in significant quantities by Douglas' water supply and wastewater collection system. Water use in the Project Area is discussed in the Surface Water and Groundwater sections of this EA.

Environmental Consequences

None of the Alternatives are expected to impose significant positive or negative impacts on energy supplies and natural resources. The wastewater collection system flows by gravity and none of the Alternatives will significantly increase the use of electricity for groundwater pumps and other portions of the potable water distribution system. Alternative 2 could indirectly increase the use of energy supplies and natural resources in the Project Area if the availability of municipal water and sewer hook-ups induces more growth in the *colonias* than is expected under Alternatives 1 and 3. The rate of future development in the project area, however, is expected to be influenced more by the local economy than the availability of municipal water and sewer hook-ups.

Alternatives 1, 2, and 3 are not expected to generate transboundary impacts to energy or natural resource use in Mexico.

3.7 NOISE

Affected Environment

Existing background noise levels in Douglas are probably affected by the following sources: wind, traffic, occasional construction activities, and other common city noises.

Environmental Consequences

None of the Alternatives are expected to impose significant long-term noise impacts on the Project Area. Background noise levels may be elevated during construction activities associated with Alternatives 2 and 3. Construction noises tend to be short in duration and concentrated around the immediate work area. Construction related noise will be mitigated through the use of standard procedures such as specific, weekday hours of operation and the use of mufflers on construction equipment.

Alternatives 1, 2, and 3 are not expected to generate transboundary noise impacts in Mexico.

3.8 PUBLIC HEALTH AND SAFETY

Affected Environment

Current health concerns are associated with discharges of raw sewage in the neighborhoods, either from failing septic systems or sewer backups, and low pressure in the potable water distribution lines on the east side of town. Low water pressure can lead to bacteria and algae growth in the distribution lines and unacceptably low chlorine residuals at the far ends of the system. The City is also concerned about health issues associated with a lack of reliable potable water sources for residents not connected to the municipal system.

Environmental Consequences

Alternative 1 results in a continuation of public health and safety concerns within the Project Area. Without proper maintenance, septic systems will continue to fail and residents will not be able to replace these systems. The small lot size typically found in the Project Area does not have room for replacement septic systems and this may continue to result, as it has in the past, in sewage overflows coming from the septic tanks and reaching backyards and streets. Individuals will continue to drill individual water wells for potable drinking water. Again, because of the small lot sizes in many of the Project Area developments, wells are not installed with the proper setbacks from property lines, buildings, or septic systems. As a result, the quality of groundwater is threatened at each well. This Alternative will also lead to failure of the existing municipal potable water system when older parts of the system are not rehabilitated.

Alternative 2 provides the most positive benefits to public health and safety. Under Alternative 2, all current Project Area residents will be connected to the water and sewer system and the water pressure on the east side of town will be sufficient for maintaining public health. The City will be able to ensure that all Project Area residents are using potable water treated to drinking water standards, under Alternative 2.

Alternative 3 will provide municipal water and wastewater service to the entire area within the existing Douglas city limits. The *colonias* will not receive service and will continue to rely upon septic systems and individual water supply wells. The impacts associated with a continuation of these activities are expected to be the same as those presented under Alternative 1.

Alternatives 1, 2, and 3 are not expected to generate transboundary impacts to public health and safety in Mexico. Discharges of treated effluent will meet Arizona aquifer water quality standards and be de-chlorinated for irrigation use in Mexico (*see* Section 2.1.2).

3.9 POPULATION AND ECONOMICS

Affected Environment

Douglas was founded in 1901 as a site for a copper smelter and incorporated in 1905 (ADC 1999). The Project Area location on the U.S. - Mexico border makes international trade an important component of the local economy (ADC 1999). Douglas contains three manufacturing plants; Agua Prieta, Mexico has 33 manufacturing facilities. The Arizona Department of Commerce estimates that 80 percent of personal income generated by the factories in Agua Prieta is spent in Douglas. Service industries catering to shoppers from Agua Prieta and other parts of Mexico account for 47 percent of employment in Douglas (ADC 1999). The City's proximity to Mexico and other recreation areas makes it popular with retirees and tourists (ADC 1999).

The population of the Project Area was estimated to be 20,605 persons in 1996. Table 11 presents growth indicators published by the Arizona Department of Commerce (1997).

Table 11. City of Douglas Growth Indicators

	1990	**1996**	**1997**
Taxable Sales ($)	99,638,900	117,731,140	127,036,800
Postal Receipts ($)	1,036,102	1,063,458	1,267,266
New Building Permits	150	94	118
School Enrollment	4,412	4,437	4,682
Net Assessed Valuation ($)	22,927,209	31,855,701	31,727,825

SOURCE: ADC 1998

The median family income in 1989 for Douglas and Pirtleville were $14,994 and $16,711 respectively, compared with $22,425 for all of Cochise County (U.S. Census Bureau 1990). Municipal drinking water currently costs $5.50 or $9.50 per month for a 5/8 - 3/4 inch line plus 80 cents per 1,000 gallons. The City anticipates that water and sewer service charges will be increased by $1.00 per year for the next 7 years to pay for the improvements.

Environmental Consequences

Alternative 1 may have a negative economic impact on individuals not currently connected to the municipal potable water and wastewater collection system. These individuals may have to pump septic systems on a regular basis to prevent failure. Also, water well owners must absorb the full cost of deepening individual water wells if the aquifer level declines again in the future.

Alternative 2 results in expansion and rehabilitation of the potable water distribution and sewage collection systems. Under this Alternative, both systems will be expanded to provide service to the entire Project Area. Current septic users will be able to curtail use of septic systems and avoid the costs associated with maintenance and replacement of failed systems. Providing potable water to all current project residents eliminates the need for small, expensive, individual water wells, which tend to perform water wasting practices. Groundwater pumping will be concentrated on the City wells and individuals will not have to drill new wells, or drill existing wells deeper, to avoid interference from other wells in the neighborhood. Residents will see modest increases in water and sewer charges over the next 7 years, under Alternative 2. These costs should be somewhat offset by avoided costs such as septic system maintenance, well drilling, and health care.

Indirectly, Alternative 2 should improve economic opportunities for Project Area residents by providing reliable water and sewer service to businesses and households. Population growth may be slightly accelerated as a result of improved services within the Project Area.

Economic and socioeconomic impacts under Alternative 3 are not expected to be significantly different than those presented for Alternative 1. City of Douglas residents may see water and wastewater rate increases to pay for the improvements; however, the extent and duration of rate increases have not been estimated for Alternative 3. It is expected, however, that rate increases will be less than those projected for Alternative 2.

Alternatives 1, 2, and 3 are not expected to adversely impact population and economics in Mexico.

3.10 ENVIRONMENTAL JUSTICE

<u>Affected Environment</u>

A baseline environmental justice (EJ) screening process was used to identify minority or low-income communities within the Project Area. Preliminary screening for potential EJ issues is based on two general statistics. First, the screening process is used to ascertain whether the minority population percentage in the affected area is either greater than 50 percent or meaningfully greater than the minority population percentage in the general population (EPA 1997b). The concept of race as used by the Census Bureau reflects self-identification and self-classification by people according to the race with which they most closely identify (U.S. Census

Bureau 1990). Second, low-income populations are identified using either Department of Health and Human Services (HHS) poverty guidelines or the Department of Housing and Urban Development (HUD) statutory definition of very low-income for the purposes of housing benefits (EPA 1997b). The percentage of impoverished people in the affected area is compared with the percentage of people living below the poverty limit in the general population to determine if a significant difference exists. Minority and impoverished population totals and percentages estimated from 1990 U.S. Census data are presented in Table 12 (U.S. Census Bureau 1990).

Table 12. Minority and Impoverished Population Totals and Percentages for Douglas, Cochise County, and the state of Arizona, 1990

	City of Douglas	Cochise County	State of Arizona
Total Population	12,905 (100%)	97,624 (100%)	3,665,228 (100%)
White	9,260 (72%)	79,555 (81%)	2,967,682 (81%)
Black	224 (2%)	5,074 (5%)	110,062 (3%)
American Indian, Eskimo, or Aleut	74 (<1%)	1,136 (1%)	204,589 (5%)
Asian or Pacific Islander	79 (<1%)	2,139 (3%)	54,127 (2%)
Other race	3,268 (25%)	9,720 (10%)	328,768 (9%)
Persons with 1989 Income below poverty level	5,512 (43%)	18,721 (19%)	564,362 (15%)

SOURCE: 1990 U.S. Census Data

Douglas' population comprises significantly higher percentages of impoverished and minority populations than both Cochise County and Arizona as a whole (Table 12). Table 12 shows that 43 percent of the Douglas population lives below the poverty level, compared with 19 and 15 percent for Cochise County and Arizona, respectively. Twenty-five percent of Douglas' population classified themselves as "other race," more than double the reported population at the general population level. The other race classification includes all other persons not included in the "White," "Black," "American Indian, Eskimo, or Aleut," and the "Asian or Pacific Islander" race categories. Based on EPA's EJ criteria described above, the potential for EJ issues should be analyzed in conjunction with projects in the Douglas area.

Environmental Consequences

Alternative 2 will positively benefit minorities and low-income persons by providing potable water and sewer connections to neighborhoods that previously utilized septic systems and individual wells. Provision of these services is expected to increase the standard of living in the *colonias* portions of the Project Area. Alternatives 1 and 3 are a continuation of current practices in the *colonias* where individuals must install and maintain potentially inadequate septic systems and water wells if they live in an area not currently serviced by City infrastructure. These practices can adversely impact low-income populations in two primary ways:

- Septic systems may be failing because individuals do not have enough income to properly maintain these systems.
- Groundwater pumped from water wells in the *colonias* may not meet, or be treated to, drinking water standards.

Failing septic systems and potentially improperly treated drinking water present possible health risks to the minority and low-income populations in the *colonias*. These impacts may fall disproportionately on minority and low-income residents of the Project Area, based on the baseline EJ screening process. Alternative 2 is expected to alleviate these potential impacts in the Project Area, while Alternative 3 will only benefit residents within the existing Douglas city limits. Thus, Alternative 2 offers the most positive benefits to minority and low-income populations in the Project Area.

Alternatives 1, 2, and 3 are not expected to generate adverse transboundary impacts to environmental justice in Mexico.

3.11 CUMULATIVE EFFECTS

The combination of the alternatives and the improvements to the Douglas wastewater treatment plant identified in Section 2.1.2 is expected to generate positive cumulative impacts. Currently, septic conditions exist in the Rio Agua Prieta because of the river's flat gradient, warm air temperatures, occasional overflow from Douglas' secondary clarifier, and illegal sewage discharges originating in Mexico (Kartchner, *pers. Comm.* 1999). Septic conditions lead to odor problems as well as other environmental health issues.

The quality of water discharged by the Douglas wastewater treatment plant to the Rio Agua Prieta is expected to improve with the installation of a new secondary clarifier and the issuance of an APP by the ADEQ. Douglas' new, larger secondary clarifier (2.6 MGD) is in operation. The larger clarifier is expected to reduce suspended solid concentrations in the effluent by lengthening residence time, reducing the likelihood of clarifier overflows, and discontinuing use of the International Facility. The current improvements at the wastewater treatment plant require an Aquifer Protection Permit from the Arizona Department of Environmental Quality. Among monthly discharge monitoring reports to ADEQ to ensure that water quality standards are not being violated (AAC Title 18, Ch. 9). Additionally, effluent turbidity cannot exceed one nephelometric turbidity unit based on a monthly average (AAC Title 18, Ch. 11), low turbidity is indicative of an efficient treatment process. The combination of a larger secondary clarifier and compliance with the APP are expected to significantly and consistently improve the quality of Douglas' effluent and have a positive effect on odors in Mexico. Finally, the City of Douglas has committed to disinfect at a design fecal coliform level of 200 CFU (Parghi 1999). If disinfection is accomplished with chlorination, then de-chlorination must occur to prevent impacts to the Rio Agua Prieta and downstream interests.

The cumulative environmental impacts from Alternatives 2 and 3 are positive. The City of Douglas is in the process of constructing improvements to the municipal wastewater treatment plant, as discussed in Section 2.1.2. The combination of an improved wastewater treatment plant with Alternative 2 is expected to result in increased, higher quality discharges to the Rio Agua Prieta. Increased surface water flows can be used by Mexican irrigators and potentially reduce ground water withdrawals. Higher flow levels have additional environmental benefits including dilution of other sources of water pollution in Mexico and instream flows for aquatic and terrestrial wildlife. Similar positive cumulative impacts are also associated with Alternative 1, with the exception that flow rates will not increase.

As was discussed in section 3.1.3.2 above, the City of Douglas is considering a wastewater reuse program at some point in the near future. The reuse program is still in the preliminary design phase, and is not contemplated in any of the Alternatives presented in this EA. Planning for this program will probably start sometime in 2001. It is noteworthy, however, that as part of the City of Douglas' CIP, the reuse program will allow for the reduction of groundwater withdrawal from the Douglas-Agua Prieta basin by the year 2004. Water reuse eliminates the need for additional water wells for irrigation purposes. This program would use treated effluent to irrigate the golf course, airport, and other public spaces. The reuse project, however, is not part of the BECC certification package.

In the future, there could be some use by migratory or other birds of the 100 acre-foot storage reservoir associated with the proposed reuse system, which is not contemplated under Alternatives 1, 2, or 3. Water quality within the reservoir would not be expected to be detrimental to wildlife using the reservoir since this water will have gone through the wastewater treatment system and the wastewater reuse filter plant.

No other past, present, or reasonably foreseeable projects were identified that might contribute to cumulative effects along with the proposed action.

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